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ABSTRACT

A model of early phonotactic and prosodic development in Swedish children is described. Although the model is based on data about the phonology of language disordered children, it is valid for normal development and useful for diagnosis of phonological impairment. Data included a cross-sectional study of 31 language disordered children aged 4 to 8 years old, a longitudinal study of 10 of these children over a 2 to 4 year period, and a longitudinal study of 1 normal child. The model divides early phonological development into four stages characterized by criteria related to intonation patterns, canonical word forms, syllabic shapes, stress patterns, accent patterns, vowel length distinction, and diphthongization. The four stages cover the ages 10 months to 6 years. These ages refer to the normal child, while the severely language disordered child may take 2 or 3 years for each stage. The model shows that children gradually loosen their constraints on word and syllable forms in a predictable manner. Implicational relationships between aspects of phonotactic and prosodic development are also suggested by the model. A chart of the model and references are appended. (RW)

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ON PHONOTACTIC AND PROSODIC DEVELOPMENT IN NORMAL AND LANGUAGE DISORDERED SWEDISH CHILDREN

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Introduction

This paper presents a model of early phonotactic and prosodic development in Swedish children. The model is one of the results of a doctoral thesis (in progress) whose goal has been to describe phonological development in severely language disordered children. However, additional studies of normal children suggest that the model is both valid for normal development and extremely useful in the diagnosis of phonological impairment in language disordered Swedish children.

Why clinical data?

Data on language disordered children is useful because: 1) their slow rate of developing makes it is possible to get a "slow motion picture" of steps of development which otherwise pass by too quickly to be analyzed in detail. 2) It is possible to distinguish subgroups of severely language disordered children which stagnate at particular points in their language development. Analyzing these points linguistically gives a series of frozen pictures of some of the crucial turning points which are relevant for language development in general.

Data base

The model is based on data from several sources:

1) A cross-sectional study of the phonology of 31 language disordered children, aged 4;1 to 8;0. The degree of language disorder ranged from moderate to severe.

2) A longitudinal study of 10 of the above children age 4;4 to 7;0 selected to represent a homoger is group with respect to regional dialect. They were studied for two to four years.

3) A longitudinal study of one normal child. The child had been taped at two-week intervals by the Child Language Research Institute in Stockholm.* Lange and Larsson (1977) have analyzed the material syntactically.

* I thank Professor Ragnhild Söderbergh for permission to use this material.

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4) I have also had access to data collected by the prosody seminar, reported on in Bruce (1981). The following aspects were studied: word stress, word accents, vowel length, and diphthongization.

Model of early phonotactic and prosodic development in Swedish children

The model divides early phonological development into four stages which are shown in the table below. Each stage is characterized by certain phonotactic and prosodic criteria, some of which are defined below.

Intonation or pitch patterns are patterns of pitch linked to particular canonical word forms. Canonical word forms are defined by the number of syllables and syllable or segmental harmony restrictions within the word. Syllabic shapes, e.g. CV or CVC-syllables or more complex syllables with consonant clusters. Stress patterns, i.e. the patterning of stressed vs. unstressed syllables. Accent patterns, i.e. the Swedish word accents 1 and 2.

The ages stated for each stage refer to the normal main subject and are meant only as rough guidelines. As a comparison the severely language disordered children may take between 2 and 3 years for each stage.

In Stage I mono- or disyllabic canonical word forms predominate. In di-syllabic words there is usually syllable harmony. Open syllables predominate. There is a typical pattern of level stress, i.e. $$ ($ = syllable)

By Stage II closed syllables have appeared. Further, a differentiation of a trochaic ('$ø lower case ø = unstressed) and an iambic (ø'$) pattern of stress is emerging, as is vowel length contrast. Only segmental harmony, in my data usually consonant harmony, still occurs.

By Stage III a number of important steps have been taken. Most important is that 3-syllable words now occur and in connection with this both Accent 1 vs. 2 and heavy vs. light syllables are now contrastive. Vowel length contrast and diphthongization in stressed syllables are now clearly established. It is possible to recognize a clear regional dialectal specificity in the child's speech. More complex syllables are produced as a result of the emergence of consonant clusters. Often the child is not however able to include complex syllabic shapes in 3-syllable words at this stage.

In Stage IV the child is able to combine complex syllabic shapes within 3-syllable words. Now words with more than three syllables begin to occur.

Implications of the model

The model specifies that the child gradually loosens his constraints in a quite predictable way. The stages of the model also suggest specific implicational relationships between various aspects of phonotactic and prosodic development. For example, the differentiation of trochaic and iambic stress patterns appears to be a prerequisite for the development of 3-syllable words. There also seems to be a connection between the development of 3-syllable words and consonant clusters. Vowel length and diphthongization are also clearly interrelated, but it is not yet clear exactly how.

Some interesting group differences are found between the severely language disordered children as compared to the less language disordered and the normal subjects. The former 1) experiment much less with word forms and syllabic shapes, 2) cannot free themselves from their strong restrictions on word form and syllabic shape, e.g. one child gets stuck on syllable harmony, another on strong consonant harmony. At least for some of the severely language disordered children, it is likely that motor planning problems are a contributing factor.

An account of individual differences is given in Nettelbladt (in prep.).

Discussion

A model of four stages of development, defined according to phonotactic and prosodic criteria has been presented. A similiar succession of stages has been suggested by Moskowitz (1973). Earlier suggestions of stages for early phonological development (for instance Ingram, 1976, and Prutting, 1979) are here further differentiated by distinguishing separate stages II and III.

Two points should be emphasized, one primarily related to phonological development in normal children and the second to language pathology:

Early phonotactic and prosodic development are closely interrelated, as shown by the almost simultaneous emergence of 3-syllabic words, complex syllabic shapes, differentiation of stress and accent patterns and the acquisition of vowel length. Similar interconnections of early phonotactic and prosodic development are reported for Latvian by Rūķe-Draviņa (1981).

Severely language disordered children are characterized by strong syntagmatic restrictions affecting their phonotactic and prosodic development. The most important step in the phonotactic and prosodic development according to the model is between stages II & III. It is between these stages that the

severely language disordered children get stuck. In older children the various details of the two first stages may constitute "risk-symptoms" of a severe language disorder to be diagnosed differentially. Other authors have also focused on some of them as symptoms of a more severe language disorder, e.g. Panagos (1974), Ingram (1976), Lorentz (1976), Grunwell (1981).

Additionally, syntax tends to be underdeveloped in the severely language disordered children in my study. There seems to be an interesting connection between early phonotactic and syntactic development, but this problem is outside the scope of this paper.

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Model of developmental stages

Stages Ages Characteristics	I 10-20 mos	II 20-24 mos	III 2-3 years	IV 4-6 years
Intonation or pitch patterns	linked to particular canonical word forms	not yet investigated	not yet investigated	not yet investigated
Canonical word forms	$,$$ syllable harmony	$,$$ segmental harmony	$,$$ $$$ combinatorial freedom for segments	polysyllabic words (>three)
Syllabic shapes	CV or VC	CV, VC CVC	CV, VC CVC CCV, VCC	CCCV VCCC etc
Stress patterns	$,$$ level stress pattern	$,'$,ǵ (ǵ'$) unstressed vs. stressed emerging distinction trochaic vs. iambic pattern	'$, '$ǵ, ǵ'$ '$,$ǵ, '$ǵ,$ integration of accent and stress patterns	'$$$,$ etc. integration over larger rhythmic units
Accent patterns	`$$ accent 2 overgeneralized	$$, (´$$) emerging accent 1	accents 1 and 2 established	applied to larger domains
Vowel length distinction		emerging contrast V: vs. V	vowel length distinction established	
Diphthongization		emerging	established	